

## **About Adaptations for Low Vision**

The problem is easily defined: the 80 character wide by 25 line deep text display on the normal computer screen is far too small to be read easily by individuals with limited vision. The obvious answer is to make the text larger.

Traditional solutions to this problem have included oversized computer display monitors, use of closed circuit television systems (CCTVs), which produce a large print version of the computer screen on a separate monitor, and systems which bypass the computer display entirely and produce an adjustable, large print image on a separate device. None of these solutions have proven to be particularly effective, since all employ rather large and cumbersome pieces of equipment external to the computer itself and tend to be expensive and/or complex to use and maintain.

Although the obvious solution to the computer access needs of low vision students is readily apparent, there are a number of additional considerations which, although less obvious, are of equal importance. An ideal low vision system should provide the following capabilities:

### **It should produce a range of text magnifications.**

Some individuals with low vision may require very little additional magnification to work effectively with the computer display; others may require greater magnification. It is not uncommon for some persons with low vision to experience fluctuations in vision requiring frequent re-adjustments in text display size. Each of these requirements must be addressed by the low vision adaptation.

- **It should work with both text and graphics.**

To work effectively with information displayed on the computer screen, the large print adaptation must be capable of magnifying both text and graphics. As the trend in the computer industry is to develop ever more sophisticated combinations of high resolution graphics and text displays, this is a vital capability.

- **It should work with a monochrome, color or enhanced color display.**

The display monitors attached to computer systems come in a variety of configurations. Monochrome displays (typically in green or amber) are most often used for text intensive applications like word processing, database management or accounting. Color or enhanced color displays are most often used with applications which combine text and graphics such as spreadsheets, statistical analysis or computer assisted design (CAD). Large print adaptations must function smoothly and interchangeably within each of these display environments and should preserve the colors of the original screen in magnified form.

- **It should be software based.**

Low vision adaptations, in order to function unobtrusively in the educational or job setting, should be entirely software based or, at the very least, entirely self contained within the computer. Software based low vision adaptations are easily transportable from computer to computer and require no changes to existing computer systems or applications.

- **It should be cost effective.**

In addition to the intrusive nature of conventional CCTV and large display monitors for low vision computer users, the cost of conventional large



print systems has been a major factor in the limited computer access provided low vision students on many campuses. A typical CCTV system for one computer costs around \$3000.00. Purchase of sufficient numbers of CCTVs to meet the computer access needs of low vision students at most colleges is neither practical or affordable. More importantly, low vision students almost always require personal ownership of a PC and large print system to function effectively in post-secondary education. If the computer and large print adaptation must be purchased with personal funds, the \$5000 to \$6000 price tag of such a system is entirely beyond the means of most low vision students. To be practical, low vision adaptations must be affordable. Cost reductions of 50% to 90% are possible when such adaptations are based in software or employ internal hardware to produce large print displays.

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- **It should be easy to use and maintain.**

The adaptation must provide the user with a simple, easy to use method for enlarging and displaying text on the computer screen. Complex systems which require extensive training and maintenance are impractical in post-secondary education and most business settings. Instructional staff do not have the time to acquire and pass on mastery, the technical expertise to fully utilize such systems or the budget to maintain them when they need repair. An effective low vision system should be functionally available to a student following thirty minutes of instruction.

- **It should work with commercially available software.**

It is absolutely essential that low vision adaptations work with all commercially available soft-

ware, including telecommunications software. This means that the adaptation must function as a "background task," providing onscreen text magnification and manipulation without interfering with the normal operation of standard word processing, spreadsheet or other software. Specialized "large print" word processors developed specifically for low vision use, for example, represent a very limited solution to computer access for low vision students.

**It should not eliminate the system's ability to produce a normal 80 character wide by 25 line deep display if needed.**

Frequently, when working with normally sighted colleagues or instructors, it is most useful for low vision adaptations to provide an option which returns the display temporarily to a standard 80 character wide by 25 line deep display.

**It should produce a smooth, fast display of enlarged text or graphics.**

The method in which enlarged text is displayed on the screen is most important. When the viewing area is being rapidly moved from one location to another, text should be displayed quickly and smoothly rather than in erratic jerks. As the user enters text, the display should track smoothly and continuously with the cursor. Enlarged print fonts should be clearly formed on the screen. Erratic and "jerky" text displays result in visual disorientation and slower computer use for many low vision users.

**It should provide for automatic, adjustable scrolling of text.**

Low vision adaptations must provide for automatic text scrolling at adjustable rates of speed in

either horizontal or vertical directions. Since an enlarged viewing window can present only a small amount of the actual text displayed on an 80 character wide by 25 line deep screen, this is an important feature in the normal process of editing and reviewing text.

**It should allow movement of the magnified viewing window to any location on the screen.**

The system must allow the viewing window to be moved anywhere on the display screen. Important information can be stored in a variety of locations on the computer screen. The adaptation must allow the user full access to the whole screen at all times. When the user resumes data entry, the system must automatically return to the cursor location.

Several outstanding low vision systems exist for both PC and Apple Macintosh computers which meet most if not all of these requirements. As of this writing, however, there are no large print systems meeting these criteria available for the Apple II series computers. The lack of adequate large print systems for these machines is due primarily to design constraints within the computer itself. The Apple II series computers represented the best and most reliable of early microcomputers to receive wide public acceptance. However, by today's microcomputer standards, these machines are severely limited. Given the fundamental design constraints of these early microcomputers (lack of memory, slow processing speed, limited access to screen memory), it is unlikely that sophisticated large print systems can be developed for Apple II series computers.

For Apple II series computers, computer terminals used by mini and mainframe systems and the

majority of other non-PC microcomputers (i.e., Atari, Commodore, Radio Shack, etc. ), closed circuit television systems (CCTVs) or large display monitors remain the only available avenues for providing access to low vision users.

A possible exception exists with regard to mini and mainframe computer systems. Most mini and mainframe systems make provision for a process known as terminal emulation. In this mode, PC type computers can be configured to behave like the kind of computer terminal the mini or mainframe computer normally uses. This transformation is usually accomplished through a software program or hardware device. In most instances, the adaptation which produces large print display on the PC or Macintosh is unaffected by the program or device which allows terminal emulation for the mini or mainframe computer. As long as the PC or Macintosh continues to employ its own operating system while in terminal emulation mode, large print systems should remain unaffected and allow access to normal mini or mainframe functions. Likewise, PC or Macintosh computers functioning within a network system should continue to support low vision adaptations.

## **About Training People to Use Low Vision Adaptations**

*By Jctckie Wheeler  
TeleSensory Systems Incorporated  
Mountain View, California*

There are a variety of adaptations for people with low vision who wish to use a computer; most are relatively simple and straightforward to use. As with any train-

ing, it is important first to assess the individual's needs, abilities and prior knowledge before planning a training program.

### **Considerations for Teaching Students with Low Vision**

The physical environment of the classroom, especially lighting, can be quite important to the success of the visually disabled student's use of the adaptive program. Excessively bright or dim lighting as well as lighting which produces glare on the computer screen can exacerbate the visual difficulties experienced by the student. Support material should always be available in an accessible format, in large print, on tape or in text files which can be enlarged and read on the screen. Information should be presented in manageable chunks appropriate to the student's learning ability. The instructor should also be aware that the student's learning style may have been affected by his or her visual disability. It is also important to recognize that slow visual processing skills do not necessarily mean slow cognitive skills.

### **Prerequisites**

All students should be touch typists prior to starting the program.

### **Training Plan**

The training plan should take into consideration the status of the person's vision: visual acuity and the stability of their vision-does it fluctuate, is it better at

certain times during the day than at others? Is there a need for a speech output system along with the low vision aids? Will the student need support material in large print or on tape?

The instructor should also determine the student's prior knowledge of computers, word processing in general, knowledge of specific software programs, as well as the student's attitudes and perceptions of "computers" and what they can be used for. With this knowledge, the instructor will be able to approach the basics of teaching the low vision access adaptation in a manner appropriate to the knowledge and expectations of the student.

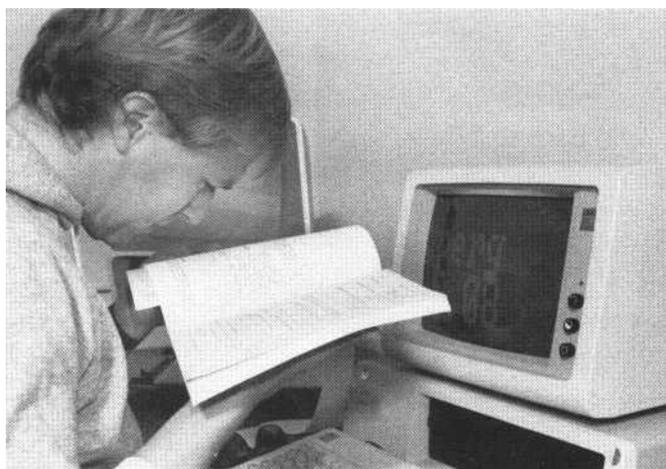
### **Where to Start**

Begin by giving the low vision individual an overview of the adaptation to be used. Have the low vision adaptation set up and ready to go with interesting or at least familiar text on the screen. Operate the system controls and set the print size for the person's reading needs.

With the magnification set to a comfortable size, give an overview of how the system works and what a person can do with it. Discuss a few how-to's but keep the overview simple and friendly.

### **Hands-On Early Success**

After seeing the initial demonstration, the student should navigate around the screen in order to get the "feel" of the navigation mechanism, whether it is a mouse, joy-stick or the computer's cursor direction keys. The student should be given assurance that they cannot make any mistakes doing this or "ruin" what is



on the screen. Have the student move the viewing window around the screen and possibly input information. Keep this first exposure to the low vision adaptation simple and direct with an eye towards providing the student with a solid experience of success.

## **Teaching the System**

When the student is comfortable with the basic concept of the system and the mechanics of navigating the viewing window, it is then time to move on to the aspects of adjusting and using the adaptation.

**Size Adjustment.** Teach the student to set and adjust the print size. Practice time should be given with all aspects of the device, but it is most important that the student become proficient at quickly and accurately setting print size for his or her personal needs. If the adaptation or computer program to be used allows for selection of background and text colors, this is also a good time to teach students how to select colors which provide optimum viewing.

**Overview.** Next, teach the student how to use the "overview" window to locate their viewing window within the overall screen. This is normally a very simple but most important operation, especially if the student is lost on a blank area of the screen.

**Scrolling.** Next, the student should learn how to scroll the text on the screen. All aspects of scrolling should be covered starting, pausing, exiting the scroll mode, adjustment of scroll rate, and scanning or quick movement up or down the screen while scrolling.

**Other Commands.** The student should learn about the other commands such as cursor tracking, single line display, and how to change the cursor position relative to the window of information.

**Practice.** Hands-on practice is the key to success. The student should use the adaptation as often as possible while learning or using the PC and associated software. At this point, it is also important for the student to begin practicing periodic scanning for new information on the computer screen which may appear periodically as a result of information being generated by the program in use.

**Loading and Set Up Procedures.** Although initial set-up of the low vision adaptation should be handled by the instructor, once the student has become familiar with the basics of the operating system, he or she should be taught the fundamentals of loading and setting up the low vision adaptation.

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**Troubleshooting.** Troubleshooting potential problems at all levels of using the program should be part of the training. Demonstrate what could go wrong and how to solve the problem. Let mistakes be opportunities for learning.

## **About Adaptations for Blind Computer Users**

Sighted individuals use a variety of techniques in viewing and producing text on the computer screen. The eye jumps from place to place. A quick glance takes the reader to an interesting sentence or a typing error.

Reading speeds up for lengthy documents, slows down for critical letter by letter, word by word analysis. The eye travels down a column of figures to check a total, glances at a program menu, examines a systems prompt or selection option. In order to make computers accessible to blind individuals, adapted computer technology must provide a nonvisual method for "seeing" the screen. This can be accomplished in two ways: the screen display can be made available in an auditory mode using advanced screen reading software and sophisticated speech synthesizers or in a tactile mode using a refreshable braille display which echoes the screen display. Because not all blind individuals read braille and because braille computer displays tend to be expensive and difficult to learn, the High-Tech Center elected to develop computer access for the blind using advanced screen reading software and speech synthesizers. These systems would enable the blind computer user to "see" the screen by employing the same scanning techniques used by sighted computer users—whether writing a document with a word processor, entering numbers in a spreadsheet, retrieving data from a database or performing a host of other commonly used computer applications.

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Auditory screen reading systems are composed of two parts: the screen reading program and the speech synthesizer. Screen reading programs are available from many sources and range in sophistication from unusably simplistic to overwhelmingly complex. The fundamental task of any screen reading system is to become the "eyes" of the blind computer user. Once loaded into the computer's memory, such programs work in conjunction with whatever applications (word processing, spreadsheets, accounting systems, etc.) are in use. Screen readers provide their users with elegant and sophisticated ways to examine the content of the computer screen using all of the visual scanning tech-

niques employed by sighted computer users. What is "seen" on the screen is sent to the speech synthesizer. The speech synthesizer is a hardware device containing sophisticated systems for translating computer code into spoken English. Like screen reading systems, speech synthesizers are available from many sources and range in speech output quality from barely understandable robotic utterances to well modulated voices with all the inflection, nuance and color of normal human speech.

Beyond the relatively simple process of providing systems capable of translating screen displays into spoken English, there are a number of considerations which must be taken into account if such adaptations are to function as genuinely effective tools for a blind computer user:

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### **Personal Considerations**

- **The blind individual must be a competent touch typist.**

It is vitally important that the blind individual seeking access to the computer be a competent touch typist. Typing proficiency should be acquired prior to the process of learning to use a screen reading system, not during. For most individuals, the frustrations caused by typing errors during the learning process will be insurmountable.

- **What will the individual be doing with the computer?**

Most surveys indicate that word processing accounts for the majority of work done by microcomputers. If word processing is to be the primary goal of the blind computer user, less sophisticated

and therefore easier to learn screen reading programs may be a better choice. If spreadsheets, programming tasks, accounting systems or database management applications will be required in addition to word processing, a more sophisticated screen reading program is called for.

### **How well does the individual hear?**

Although it may initially seem like an odd consideration, how well the blind computer user hears and understands the speech synthesizer is inextricably bound to how well the user understands what is displayed on the computer screen. In cases where the blind computer user has normal hearing, synthesizer choice is often a matter of personal preference. Some users actually prefer the more robotic voice output of low cost synthesizers to the more natural speech of costly speech output devices. Quality of speech output becomes a more critical issue when dealing with hearing impaired and some older adult blind computer users. Under these circumstances, the flexibility and quality of speech output available with more sophisticated speech systems are vital for effective computer access.

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## **System Considerations**

### **It should provide a continuous review mode.**

The majority of screen reading systems operate in two modes: review and application. Full scale screen reading is normally carried out only in the review mode. In this mode, the user can employ all the screen reader's capabilities but cannot access the capabilities of the applications program. For example, if a word processor were in use,

upon entering the review mode the document displayed on screen by the word processor could be read but not edited. In the applications mode, the word processor would function normally, but only a limited selection of screen reading options would be available. As of this writing, screen readers which provide excellent review capability while in the applications mode (a feature essential for extensive word processing) lack the sophisticated screen reading capabilities required for spreadsheets, programming and other applications which employ complex screen formats. Screen readers with sophisticated capability in review mode currently have little screen reading capacity in the application mode.

**It should work with and not impinge upon the operation of standard commercial software.**

Some screen reading systems take over function keys commonly used by many popular computer programs (WordPerfect, dBASE, Lotus, etc.). The screen reader should provide methods for reassigning its own function keys in the event that they conflict with another computer program's function key selection. In addition, the screen reader should function concurrently and harmoniously with commercially available applications software.

**It should be easy to use.**

As a class of computer adaptations, screen readers have the dubious distinction of being the most time consuming and difficult to learn. However, once the system has been installed and configured to work with the computer and speech synthesizer at hand, no more than one hour should be required for the user to learn the basic commands

for reading letters, words and lines. To achieve competency with even relatively uncomplicated screen readers typically requires two to four weeks of continuous practice. Screen readers designed to deal with complex screen environments might require eight to ten weeks of practice to acquire mastery.

**It should work with, and support the capabilities of, a variety of speech synthesizers.**

Many advanced speech synthesizers provide a wealth of features designed to improve audio perception, promote faster processing of information, enhance the quality of speech output and reduce listener fatigue. Screen readers should take full advantage of every feature offered by a particular speech synthesizer. The ability of a speech output device to employ a variety of different voices, incorporate the inflection, tone and color of natural speech and produce intelligible speech at a high rate of speed are valuable assets which should not be wasted.

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**It should read letters, words or lines forwards or backwards.**

Screen readers must be able to emulate every action in the visually oriented reading process. This includes reading single letters in order to identify possible spelling errors, words in order to orient within a line of text and lines of text in order to understand the content of the screen.

**It should provide spoken output for the military version of all letters-i.e., a Alpha, b Bravo, c Charlie, etc.**

In order to remove the confusing similarities in the articulation of certain letters (notably b and v,

p and b) common with many low cost speech synthesizers, the screen reader should provide an alternative method for pronouncing single letters using the military transmission equivalents (A becomes Alpha, B becomes Bravo, P becomes Papa, etc.). This simple addition can be enormously beneficial when high levels of accuracy are required.

- **It should read complete sentences and screens.**

Just as sighted computer users scan written documents to obtain a sense of overall continuity and flow, screen readers must provide blind computer users with options which allow these same processes to occur in an auditory mode. A well constructed screen reading environment will be able to read a complete sentence as opposed to a single screen line of text. It will provide the option of reading full screens or complete documents. In any of these modes, the screen reader should take full advantage of all options available to the speech synthesizer which assist in the production of natural sounding speech.

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- **It should provide optional spoken output of spaces and punctuation marks.**

When reading sentences, lines, screens or whole documents, many screen reading systems and speech synthesizers use punctuation marks as cues in the production of speech. In this mode, punctuation marks are used to create the pauses and rising or falling inflections which produce natural sounding speech. However, screen readers must also supply a means of pronouncing punctuation



marks literally in order to verify their correct use and location within the text of a document.

**It should provide optional spoken output of prompts and messages automatically displayed by the computer system or program in use.**

Many computer programs, particularly programs which provide remote access to other computer systems over a modem, often display messages and prompts of interest to the user regarding elapsed time, system charges, waiting messages, additional information waiting to be displayed or any one of a variety of other messages. Screen readers must be capable of monitoring screen locations where messages appear and of automatically reading any information appearing in those locations.

**It should provide a method for identifying attributes of text displayed on the screen: bold, underlined, inverse or color.**

Computer programs use a variety of methods for attracting the user's attention to some important piece of information. Screen readers must provide a method for identifying and describing the display attributes of text.

**It should provide windows: user defined screen locations which can be instantaneously accessed.**

The great majority of computer programs include screen designs which incorporate menu selection areas, help screens, or information display areas or, in the case of spread sheets, columns of numbers which must be read vertically. The solution to reading these specialized screen areas involves

the creation of user defined viewing areas called windows. Screen readers must provide a simple and easy to use technique for locating the screen area for which a window is to be defined, defining such areas and returning to them at will.

**It should support fast, accurate cursor routing.**

Frequently, when text is being examined in the review mode, the user will discover a problem area or location where he/she would like to resume editing upon exiting the review mode. In order to make that possible, screen readers must support a function know as cursor routing. When cursor routing is in use, upon exiting the review mode, the applications cursor is automatically redirected to the previous screen location of the review cursor.

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**It should support a well defined macro capability.**

The secret to creating screen reading environments which provide excellent screen reading capability while seeming to remain constantly in the applications mode rests with the program's ability to create and use macros. A macro is nothing more than a set of instructions to the screen reader which can be stored in a unique keystroke. A typical macro command designed to read one word to the right might include the following instructions: enter the review mode, read one word to the right, exit the review mode, issue the word processing command to advance the cursor one word to the right. If the screen reader is fast enough and the macro facility well designed, all of this will appear to happen without ever leaving

the application. Well designed macros can allow a screen reading environment to be designed in such a way that it appears to merge with the program whose screens it is reading.

**N It should work with terminal emulation programs.**

Because most terminals used by mini and mainframe computer systems do not support screen reading software, the only available access to such systems for blind computer users may be through a process called terminal emulation. In this mode, PC type computers can be configured to behave like the kind of computer terminal the mini or mainframe computer normally uses. This transformation is usually accomplished through a software program or hardware device. In many instances, the screen reading system is unaffected by the program or device which allows terminal emulation for the mini or mainframe computer. As long as the PC continues to employ its own operating system while in terminal emulation mode, the screen reader should remain unaffected and allow access to normal mini or mainframe functions. Likewise, PCs functioning within a network computer system should continue to support screen reading adaptations.

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For blind computer users who read braille, a number of printers exist which, when used with specialized software, produce high quality, grade two braille at a maximum of 80 characters per line. Reproduction of brailled graphics, as of this writing, remains experimental with no fixed standards yet established.

Excellent screen reading systems exist for IBM

PS/2, IBM PC, 100% PC compatible, Apple II, and Macintosh series computers.

## **About Training Blind Individuals to Use Computers**

*By Jackie Wheeler  
TeleSensory System Incorporated  
Mountain View, California*

The wide variety of screen reading systems and speech output devices for computers present a variety of interesting challenges when planning a training program for blind individuals. Programs vary in simplicity-which sometimes means "easy-to-use" and sometimes indicates a very limited program. Some programs, although very sophisticated, are not difficult to use and can be individualized to fit the student's needs. The quality of speech output devices varies from easy-to-understand to output that requires real concentration for accurate comprehension. The wide range of synthesizers and screen reading programs can be mixed and matched to meet the specific needs of the blind individual. The goals, abilities and requirements of the student should be carefully considered in the course of planning a training program.

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It is most important that you, as the instructor, understand and feel comfortable with the screen reading program. Most likely, you will choose one screen reading program to be used at your center. Practice with the screen reading system and the software with which you will be using it until you are quite familiar with its use.

In working with blind students who have no previous computer experience, it is almost always best to begin by teaching the student to use a word processing program in conjunction with the screen reading system. In this way, the student gains access to a valuable and useful tool with immediate practical application in his or her day-to-day activities. Instruction in the use of the word processing system should be conducted in a step-by-step manner with special attention to ways of locating text and correcting errors.

When you are ready to work with a student, begin by evaluating his or her needs, abilities, and prior computer knowledge. If the student has enough vision to read large print on the screen, you may well wish to teach the use of a large print adaptation along with the screen reading system.

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Exciting things happen when teaching people how to access a computer, especially when they start to understand the limitless options now available when using this new tool. Although teaching people to use computers may be new for you, remember that the computer is just a tool and your basic teaching skills and abilities are the important parts of the total training equation. Relax and have fun.

### **Considerations for Teaching Students Who Are Blind**

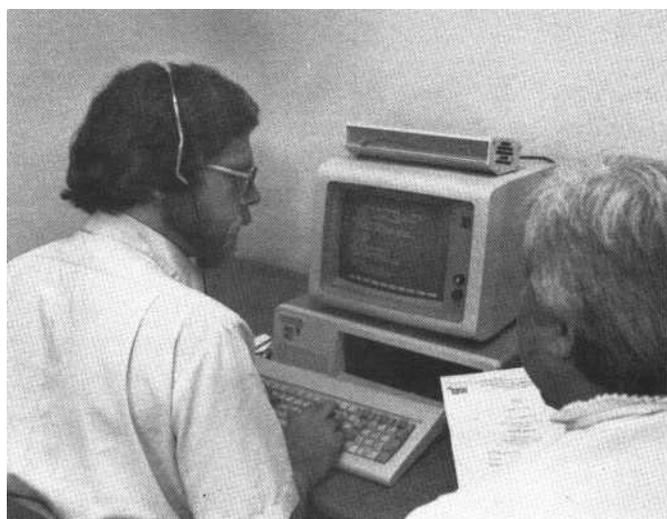
Many aspects of the classroom environment are important when working with blind students. The classroom needs to be physically accessible, and the placement of furniture and equipment should remain as consistent as possible. The noise level should be kept low, and, unless the teaching is one-to-one in an isolated setting, students should always use headsets with the speech output devices.

Support materials should be available in braille, large print, and/or on tape. Disks and other equipment should be marked in braille and/or large print as needed. It is possible to make tactile replicas of screens which can be valuable in conveying to the blind student a sense of physical screen layout. It is also possible to emboss (with a braille printer) screens of text. This can give the student added information and reference material. The students need to know where support and reference materials are located for easy, independent access. The student's individual materials should be marked and located at or near their work station.

Although many people who are blind are quite familiar with a typewriter keyboard, a computer keyboard may be a new experience. Additional special keys (Esc, Alt, Ctrl, Home, etc.) exist on the personal computer keyboard and there are no fixed standards as to where such keys are located. Some keyboards are much easier to learn and use than others. To assist blind individuals with locating these nonstandard keys, such keys can be tactilely marked in a variety of texturally distinct ways: Velcro or felt dots, transparent braille labels, or dots of glue can all be successfully used. On the main alphanumeric keyboard, keys that are helpful to mark include the Shift, F, J, 4, 7 and 5 on the cursor/number pad. Special keys to mark include Ctrl, Alt, Esc, Return or Enter, Backspace, Insert and Delete.

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Mobility skills and concepts often are a factor in teaching a totally blind student. The instructor should be aware of access to and from the classroom as well as mobility issues within the classroom itself. Mobility concepts bear a strong relationship to general spatial concepts. Blind students who experience difficulty with mobility and spatial concepts may also experience difficulty with page formatting concepts as well. Such students will require additional time and may benefit



from tactile representations of the computer screen or hard-copy braille information.

The individual student's learning style may be affected by a wide variety of factors. These can include, but are not limited to, degree of vision loss, cause of blindness, the length of time the person has been blind or had low vision, vision fluctuation and past educational experiences. The amount of information presented at any one time should be carefully matched to the student's learning capabilities. Again, be aware of the fact that learning styles and educational experiences may have been influenced by visual difficulties.

### **Prerequisites**

All students should be touch typists prior to starting the course.

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### **Training Plan Information**

Along with information about the student's visual status, you will need to determine the status of the student's "computer knowledge." This should include the extent of prior knowledge or experience with computers, word processing in general, and other software programs as well as the student's attitudes and perceptions about computers-their uses and their limitations.

### **Training Plan**

Plan for early success. A successful experience with the access device within the first thirty minutes will help assure future successful sessions. It is best to sep-

arate the material for each individual student into manageable blocks of information. Try not to overwhelm the student with too much information at one time, especially with computer jargon and unfamiliar acronyms (unless this is what they can relate to). It is important to provide time for independent practice, making sure that support materials and help are always available.

Take into account information about the student's background, interests, capabilities, and needs when producing a plan. Remember to be flexible-people learn to use computers in a variety of ways that can change and "take-off" at any time. Sometimes a student can be highly motivated because of a specific software program.

### **Where to Start**

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The first step is to give an overview of the screen reading program. Make it general but touch on aspects and commands that will be important for the student's needs. Use material that is fun and interesting and possibly familiar to the student. Set up the screen reading program in the computer along with the software you will be teaching. Set the appropriate speed, pitch, and volume for the synthesizer in your environment. At first, use the screen reading system to read what is on the screen and simply have the student listen to the text. Give a basic "tour" of what the screen reading program is all about.

Discuss a few how-to's and give an orientation to the personal computer keyboard and the most frequently used commands. Give the student quick reference material in braille or large print as support. Keep this a short orientation on the basics-simple and friendly.

## **Hands-On Early Success**

**Reading.** After the overview "tour," turn the keyboard over to the student. Let the student practice reading the familiar text that you previewed with a few of the basic up/down and right/left screen reading commands. Basic instruction should include reading lines, words and characters, and, if your screen reader uses one, learning how to go into and out of a review mode. Let the students have time to navigate around the screen and read independently. Assure the students that they cannot damage the computer, screen reading system or speech output device.

**Writing.** Have the student create a short paragraph of text. Once the screen reading system has been understood, many students enjoy creating their own text. Other students may feel threatened or insecure about using a new tool, or, perhaps, simply can't create on the spot. It's a good idea to have something ready to dictate, or you may simply ask the student to write some familiar text such as a poem, song, or nursery rhyme.

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With a familiar paragraph to read, the student should now practice reading their own text. During this writing, the student should not be concerned with typing errors. The focus of the exercise should be simply writing and reading. When this exercise has been successfully completed, introduce the student to reading for error identification and using the backspace erase function of the word processor to correct discovered errors.

## **More Screen Reading Commands**

When the student is familiar with the basic line, word and character navigation commands, it is time to

move on. The number of other commands that you teach during one lesson will depend on the student's progress. Make sure you give the student adequate, independent practice time.

It is time to teach

### **Help commands**

- **Quick access of the top and bottom of screen**
- **How to access a specific line of text**
- **How to hear what is to the right or left of the cursor on a line**
- **How to hear the screen coordinates for the writing cursor and the reading cursor**
- **How to go into and out of a review mode**
- **How to set and find placemarkers**
- o **Reading within columns; setting and storing column marks**
- **If in a review mode, how to put the writing cursor at the point of the review cursor and exit the review mode. This is called routing in some programs.**

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### **Setting and Changing Options**

Most programs give the user great flexibility in the way the text is spoken. This is quite important because at times it is important to hear everything that is on the screen; spoken punctuation marks and spaces, for example. At other times, it is best just to hear straight text. The number and types of options vary between programs. Review the options available in the program you are using and determine those best suited for the individual student's needs. Give the student an

overview of the options. Discuss when and where certain options might be useful.

Show the student how to learn the current options settings and then how to change and store option settings.

Some basic options settings to teach might include

Letters spoken as typed

Numbers as single digits or as words

Punctuation marks, spoken or not

Spaces between words, spoken or not

Text colors, spoken or not

Text attributes (bold, underlined, etc.), spoken or not

Have the student work independently with one combination of options, then change one setting at a time. This will allow the student to determine which options work best with what programs.

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## **Start Up**

Start up procedures can be taught throughout the course of instruction. It's best not to have the student worry too much about specifics initially. At first, the student simply needs to understand how to start the screen reading program. It is, however, very important for the student to know the entire set up procedure by the end of the training program.

## **Troubleshooting**

Throughout the training, it is good to either give examples of problems that could arise or use mistakes

as opportunities for lessons on potential difficulties and how to solve them. Periodically, present problems for the student to solve. Problems will occur spontaneously during the course of the training. Discuss with the student the nature of the problem, when and how it occurred and how the problem can be solved. In order to function effectively when working independently, the student must be aware of as many problem situations and their solutions as possible.

### **Independent Practice**

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It is critical for the student to work independently on each area of the screen reading program. Integration of the screen reading system along with instruction in the use of other software (typically, word processing) should be carried out concurrently. Along the way, give simple reviews so you and the student can measure progress. Reviews can range from a few how-to questions to writing documents free from typographical errors.

Enjoy with your student the excitement of learning to capture some of the power of a personal computer.